Mr. Laine

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HEADQUARTERS
6511TH TEST GROUP (PARACHUTE)(ARDC)
AUXILIARY LANDING FIELD
El Centro, California

PROGRESS REPORT

SEPTEMBER 1960

PREPARED BY

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THIS REPORT HAS BEEN REVIEWED AND IS APPROVED

T. C. RAUDEBAUGH, Lt. Colonel, USAF, Commander

On file USAF release instructions apply.

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WADD has requested proposals for studies of a low level aerial delivery system in accordance with Exhibit WCLEHA-62. Awaiting an approved test directive.

Program Structure 720F

FTL-219 PRESSURE PACKED PARACHUTE TEST

M. Steinthal & Co., Inc. has been authorized to conduct a study and drop test program in accordance with Exhibit WCLEHR-130, dated 6 February 1959 under Contractual Instrument No. AF 33(600)-39643. An approved test directive has been received. A test program is being coordinated with WADD.

Program Structure 720F

FTL-228 100-FT. D_O RECOVERY CHUTE

Clusters of 100-ft. D_O recovery parachutes will be tested at 250 KEAS at 3,000- and 12,000-ft. pressure altitudes with weights ranging from 25,000 to 37,500 pounds. Awaiting an approved test directive.

Program Structure 720F

FTL-229 67-FT D_O RECOVERY CHUTE

Clusters of 67-ft. D_O recovery parachutes will be tested at 250 KEAS at 3,000- and 12,000-ft. pressure altitudes with a weight of 25,000 pounds. Awaiting an approved test directive.

Program Structure 750A

FTL-214 NOSE CAPSULE RECOVERY

Lockheed Aircraft Company is developing a nose capsule parachute recovery system which will be tested at this Group. An approved test directive has been received. Awaiting contractor for test program coordination.

Program Structure 914A

FTL-213 MODIFIED C-11 CANOPY

Tests will be made to determine the effect of a secondary parachute placed within the C-11 canopy. Awaiting an approved test directive.

Program Structure 520B

FTL-223 AERIAL DELIVERY SYSTEM CARGO CONTAINERS

WADD has requested that engineering testing be conducted to determine the compatibility of the C-130 cargo aircraft using a modified 108-in. wide dual rail system and two types of cargo re-supply platforms. The weight range of the loaded platforms will be from 25,000 to 35,000 lb. Awaiting an approved test directive.

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Program Structure 040A

FTL-220 PROFICIENCY AND LIVE JUMP TRAINING

Twenty-three proficiency jumps were made. On each jump parachute deployment and opening were satisfactory. Test information follows:

Aircraft	Jumps	Parachute assembly	Launch (IAS) (kt)	Pressure altitude (ft)	Free fall delay (sec)
C-130	2	A/P 28S-2	110	2,000	-
C-130	1	A/P 28S-2	110	4,000	-
C-130	1	A/P 28S-3	110	10,000	35
C-130	2	A/P 28S-4	110	4,000	-
R-4D	4	50C7024-15	110	5,000	5
R-4D	4*	50C7024-15	110	6,000	5
R-4D	3	50C7024-15	110	8,000	15
R-4D	3	50C7024-15	110	8,000	20
C-130	3	50C7024-15	110	10,000	35

* Water jumps

Teflon lined power cable housings and ripcord connector pulleys have been installed on twelve (12) type 50C7024-15 parachute assemblies.

Program Structure 102A

FTL-211 B-58 ESCAPE CAPSULE SYSTEM

Three functional tests were made on a 40.9-ft. D_o ring-slot parachute with a

Program Structure 102A (CONT'D)

FTL-211 (CONT'D) B-58 ESCAPE CAPSULE SYSTEM

560-lb. cylindrical test vehicle. Deployment of the parachute system was initiated by the firing of an explosive charge two seconds after the cylindrical vehicle dropped from the aircraft. The explosive charge blew off the vehicle door and deployed a 40-in. D_o vane-type pilot chute which deployed the main parachute. A 2000-lb. reefing line 12.9 feet long was used with three Ordnance Associates OA2-C 2-sec. delay reefing-line cutters. Test information follows:

Drop	Launch EAS (kt)	Pressure altitude (ft)	Open time (sec)	Down time (sec)	Oscillation (±°)	Remarks
1641-F-60	351	1440	7.0	67.0	15	(1)
1587-F-60	430	1550	-	11.0	-	(2)
1867-F-60	351	1430	5.8	71.3	25	(3)

(1) The selvage edge was strained on 50% of the bottom three rings. One cutter had a mechanical failure.

(2) All suspension lines were broken. The selvage edge was strained on 50% of the bottom three rings. There were 31 blown sections throughout the canopy.

(3) The selvage edge was strained on 50% of the bottom three rings. Pilot chute was blown and the bridle line broken. The apex lines had friction burns. Two reefing line cutters had a mechanical failure.

Program Structure 117L

FTL-221 SUPPORT SAMOS PARACHUTE RECOVERY

Six tests were made. One test each was made on a 6-ft. D_o and a 6.8-ft. D_o conical-ribbon stabilization chute. A cylindrical vehicle weighted to 1700 lbs. was used. Deployment was initiated one second after dropaway by ejection of the parachute compartment door. Ten seconds after deployment the stabilization chute was released and a 67.2-ft. D_o extended skirt parachute deployed to recover the load. One test was made with the 84-ft. D_o ring-sail recovery chute with a reefing line length 22ft. and 4-sec. delay reefing-line cutters; a 20-ft. D_o ring-slot

air pick-up chute was attached to the apex by a 165-ft. towline. One test was made with a 20-ft. D_o ring-slot air-pick-up chute attached to a 50-lb. load which was contained in a 1646-lb. cylindrical test vehicle. One test was made with a 27-ft. D_o conical-ribbon air-pick-up chute attached to a 90-lb. load which was contained in a 1646-lb. cylindrical test vehicle. In each case the air-pick-up chute deployed a 75-ft. D_o ring-sail recovery parachute which was reefed with a 27-ft. 11-in. line and two 6-second cutters; the 75-ft. chute recovered the 1646-lb. test vehicle. One test was made with the 75-ft. D_o ring-sail recovery chute with the 27-ft. D_o conical ribbon air-pick-up chute attached to the apex by a 150-ft. towline. On all tests, deployment was initiated one second after dropaway from the aircraft by ejection of the parachute compartment door. Test information follows:

Drop	Launch IAS (kt)	Pressure altitude (ft)	Load (lb)	Parachute	Open time* (sec)	Down time* (sec)	Reefed open force (lb)	Opening force (lb)	Remarks**
1640-F-60	254	6,000	1700	6-ft FIST Ribbon	1.6	113.6	-	2,075	-
				67.2-ft E.S.	-	113.6	-	-	(1)
1841-F-60	200	6,000	1700	6.8-ft FIST Ribbon	1.8	126.2	-	3,025	-
				67.2-ft E.S.	20.4	126.2	4,450	4,400	(1)
1588-F-60	150	49,650	2185	20-ft D_o Ring slot	-	1537.3	-	5,200	(2)
									(2)
				84-ft D_o Ring sail	-	1537.3	10,500	16,800	(3)
1839-F-60	141	49,550	50	20-ft D_o Ring slot	2.2	-	-	3,350	(4)
			1646	75-ft D_o Ring sail	-	1675.1	11,250	7,950	(5)

* Stop watch

** Parachute deployment and opening were satisfactory and parachutes were undamaged unless otherwise indicated.

Program Structure 117L (CONT'D)

FTL-221 (CONT'D) SUPPORT SAMOS PARACHUTE RECOVERY

Drop	Launch IAS (kt)	Pressure altitude (ft)	Load (lb)	Parachute	Open time* (sec)	Down time* (sec)	Reefed open force (lb)	Opening force (lb)	Remarks**
1877-F-60	142	48,100	90	27-ft D_o Conical ribbon	-	-	2,600	1,475	-
			1646	75-ft D_o Ring sail	3.6	1619.8	10,125	6,750	-
1876-F-60	144	49,100	1585	27-ft D_o Conical ribbon	-	1645.0	4,750	1,000	(6)
				75-ft D_o Ring sail	7.9	1645.0	10,950	7,450	-

(1) Not a test item.

(2) Towline broke at snatch.

(3) Peak force only, tensiometer time base failed after reefed open.

(4) One section blown.

(5) Two sections blown

(6) For this test the air-pick-up chute was reefed with a 6-ft. 8-in. reefing line and 6-sec. delay reefing line cutters.

* Stop watch

** Parachute deployment and opening were satisfactory and parachutes were undamaged unless otherwise indicated.

Program Structure 201B

FTL-204 LIVE JUMPS OF MODEL "B" SEAT

Twenty-eight tests were made to determine the reliability of the "B" seat parachute system. Twenty-four of the drops were conducted with articulated dummies dressed with the contractor modified personnel parachutes, demonstrating an overside bailout performance. Two of the seat drops were made with articulated dummies from a C-130 aircraft to similate the actual live jump configuration of the latest production F-106 B seat. Two gravity seat drops were made from a C-130 aircraft with parachute test jumpers using the same production F-106 B ejection seat. All the personnel parachutes used were modified by the contractor. These modifications were: (1) larger grommets on seven of the pack flaps and (2) a shorter pack closing loop for the top flaps of the pack. These changes were incorporated for better deployment of the pilot chute. Test information follows:

a. Modified Parachute Tests with Dummy

Drop	Launch IAS (kt)	Pressure altitude (ft)	Open time* (sec)	Down time* (sec)	Deployment	Remarks**
1594-F-60	120	2000	6.5	83.9	poor	-
1644-F-60	100	1500	5.1	60.5	poor	-
1645-F-60	100	1500	6.1	63.2	poor	-
1646-F-60	100	1500	6.4	63.4	good	-
1647-F-60	100	1500	6.5	62.1	good	-
1648-F-60	100	1500	5.0	62.6	good	-
1649-F-60	100	2000	5.6	73.4	good	-
1650-F-60	100	2000	7.7	67.8	poor	-
1651-F-60	100	2000	6.4	75.4	poor	-
1652-F-60	100	2000	7.5	78.5	poor	-
1653-F-60	100	2000	8.0	76.1	poor	-
1654-F-60	100	2000	5.7	90.9	good	-
1655-F-60	100	2000	5.2	76.0	poor	-

* Stop watch

** Dummy was recovered satisfactorily by the main parachute in each test unless otherwise indicated.

Program Structure 201B (CONT'D)

FTL-204 (CONT'D) LIVE JUMPS OF MODEL "B" SEAT

Drop	Launch IAS (kt)	Pressure altitude (ft)	Open time* (sec)	Down time* (sec)	Deployment	Remarks**
1656-F-60	100	2000	5.3	82.4	poor	-
1657-F-60	100	2000	6.0	81.4	poor	-
1659-F-60	100	2000	7.1	74.7	poor	-
1660-F-60	100	2000	8.3	70.6	good	-
1661-F-60	100	2000	8.7	80.3	poor	-
1662-F-60	100	2000	-	31.3	-	(1)
1663-F-60	100	2000	-	21.2	-	(2)
1664-F-60	100	2000	7.0	77.2	poor	-
1665-F-60	100	2000	6.4	66.7	poor	-
1666-F-60	100	2000	7.1	72.4	poor	-
1667-F-60	100	2000	-	35.8	-	(3)

(1) Pilot chute did not deploy. Recovered by reserve.

(2) Recovered by reserve. F-1B arming ball not pulled to open pack.

(3) 28-ft. canopy tangled with dummy. Recovered by reserve.

* Stop watch

** Dummy was recovered satisfactorily by the main parachute in each test unless otherwise indicated.

b. Dummy Gravity Drop Tests with Complete Seat

Drop	Launch IAS (kt)	Pressure altitude (ft)	Dummy-seat separation time* (sec)	28-ft chute open time* (sec)	Remarks
1712-F-60	110	15,000	2.3	6.5	(1)

Program Structure 201B (CONT'D)

FTL-204 (CONT'D) LIVE JUMPS OF MODEL "B" SEAT

Drop	Launch IAS (kt)	Pressure altitude (ft)	Dummy-seat separation time* (sec)	28-ft chute open time* (sec)	Remarks
1713-F-60	110	30,000	51.5	54.8	(2)

(1) Dummy was recovered. Survival kits backlashed. Seat was not recovered because seat recovery static line tangled with pilot chute used to deploy seat recovery parachute.

(2) Dummy and seat were recovered. Static line to actuate seat recovery parachute was tied permanently to dummy and broke free from canopy. No kit backlash resulted. Used 100-lb. break cord on survival kit anti-backlash line; it functioned satisfactorily. Seat was rotating prior to dummy-seat separation.

* Separation and opening times evaluated from motion picture.

c. Live Gravity Drop Tests with Complete Seat

1842-F-60	110	15,000	2.4	6.3	(1)
1843-F-60	130	15,000	2.5	6.4	(2)

(1) Jumper and seat were recovered. Static line was used to deploy seat recovery parachute. Static line entangled with jumper during seat separation and parachute descent. Kits increased parachute oscillation during descent. Kit was jettisoned prior to ground impact. Landing was uneventful.

(2) Jumper and seat were recovered. Seat recovery static line entangled with jumper during seat separation and descent. Jumper disconnected static line. Kits increased parachute oscillation during descent. Kits released to 30-ft. below jumper prior to ground impact. Landing was uneventful.

* Separation and opening times evaluated from motion picture.

Program Structure 201B

FTL-207 F-106 (ICES) SURVIVAL KITS

No tests.

Program Structure 426L

FTL-191 XQ-4B DRONE RECOVERY, STAGE II

All tests at El Centro have been completed. Testing will continue at Holloman AFB.

Program Structure 520B

FTL-198 TEST OF LOW COST PARACHUTES

No tests.

Program Structure 530A

FTL-140 G-11A PARACHUTE RETARDATION SYSTEMS

One test was conducted on a G-11A parachute. A 12-ft. D_o ring-slot pilot chute was permanently attached to the apex of the G-11A parachute with a 25-ft. bridle. The G-11A parachute was reefed with a 44-ft. reefing line. Four Ordnance Associates OA-A9 reefing-line cutters with 1-sec. time delay were used. The 6900-lb. test vehicle was launched at 200 KIAS and at 2,500-ft. pressure altitude. The vent area of the G-11A was reduced from 11.5 ft.^{2} to 3.1 ft.^{2} by a 12-in. wide strip of 4.75-oz. nylon cloth sewn to vent band. This was the final test on the program. A technical report is being written. Test information follows.

Program Structure 530A (CONT'D)

FTL-140 (CONT'D)

Drop	Snatch force (lb)	Reefed open force (lb)	Full open force (lb)	Parachute full open time* (sec)	Remarks
1436F-60	13,000	27,000	16,500	15.2	(1)

(1) Parachute damage consisted of one section blown, five 2-in. to 5-in. tears and 15 broken vent line casings.

* Time was checked by movie with timing light and by Force versus Time telemetric record.

Program Structure 921A

FTL-210 RISER CUTTER HIGH-SPEED TESTS

No tests. Testing of riser cutter installation will be accomplished in conjunction with Project 6015, Test Parachute Components, FTL-201. Testing has been suspended on FTL-201 pending delivery of contractor furnished test items which are scheduled for delivery in October 1960.

Program Structure 609A

FTL-208 HYPER ENVIRONMENTAL TEST SYSTEM

No tests. The three tests scheduled for the Salton Sea Range were cancelled. Three tests are planned for the latter part of October 1960.

Program Structure 720F

FTL-143 CLUSTER OF THREE RECOVERY PARACHUTES

Three tests were conducted with a cluster of three 28-ft. D_o flat circular parachutes (C-9 canopy). All parachutes were reefed with 750-lb. braided nylon cord 10-ft. long. On each parachute, three 2-sec. time-delay cutters were used. A 66-in. flat circular pilot chute was permanently attached to the apex of each of the three 28-ft. parachutes with a 9-ft. bridle. The load weight was an 800-lb. cylindrical vehicle. The vehicle was launched at 1500-ft. pressure altitude. Two seconds after release of the vehicle from the aircraft, deployment of the parachute cluster was initiated by ejection of the test vehicle door. The door extracted a 48-in. R.G.S. extraction parachute which was attached with a 12-ft. bridle to each of the three 28-ft. parachute bags. Test information follows:

Drop		Snatch force (lb)	Reefed open force (lb)	Full open force (lb)	Parachute full open time (sec)	Launch IAS (kt)	Remarks
1582-F-60	C*	8500	14,500	4200	-	-	
	1st	2200	5,800	2100	4.0	325	(1)
	2nd	1500	3,400	700	4.2	-	(2)
	3rd	2300	4,900	600	5.9	-	(3)
1741-F-60	C*	5800	11,600	4300	-	250	
	1st	1900	4,000	3500	3.6	250	(4)
	2nd	1050	3,030	500	5.1	250	(4)
	3rd	2100	3,900	500	5.9	250	(4)
1750-F-60	C*	6300	11,500	3800	-	250	
	1st	1700	5,100	2750	3.8	250	(5)
	2nd	1650	3,400	500	4.0	250	(5)
	3rd	1600	3,500	600	4.1	250	(5)

* Cluster riser forces.

(1) One section blown; two 6-in tears in apex.

Program Structure 720F (CONT'D)

FTL-143 (CONT'D) CLUSTER OF THREE RECOVERY PARACHUTES

(2) No damage.

(3) Three sections blown and several 1-in. holes in apex.

(4) Parachutes were damaged after contact with the ground. No photo coverage or Askania data was obtained due to adverse weather conditions at the time of the test.

(5) No damage to parachutes.

Program Structure 720F

FTL-147 TESTS OF PARACHUTES IN VARIOUS PERMEABILITY GROUPS

Two tests were conducted with the 24-ft. flat circular canopies using B-4 packs and A-3 pilot chutes with 32-in. bridle lines of 4500-lb. breaking strength. One test was made from the Whirl Tower and one test was made from the C-130 aircraft at 500 feet above the test area. The canopies tested were both in Porosity Group 5. Air permeability readings at 1/2-in. water pressure differential were taken after the drop tests. Test information follows:

Drop	Canopy	Launch IAS (kt)	Open time (sec)	Down time (sec)	Average air permeability of cloth area in cfm/ft^2	Remarks
1601-F-60	322523	150	5.1	20.0	176	(1)(4)(3)
7447-F-60	322520	150	1.5	-	144	(2)(5)

(1) Test from C-130 aircraft.

(2) Test from Whirl Tower.

(3) Pilot chute hesitated

(4) Three twists were packed into the suspension lines directly above the risers.

Program Structure 720F (CONT'D)

FTL-147 (CONT'D) TESTS OF PARACHUTES IN VARIOUS PERMEABILITY GROUPS

(5) Canopy packed without twists in the suspension lines.

Program Structure 720F

FTL-199 CLUSTER PARACHUTES (PIONEER)

Four tests were made on a cluster of three 28-ft. D_o heavy duty flat circular parachutes with an 850-lb. cylindrical test vehicle. Deployment of the parachute system was initiated by the firing of an explosive charge two seconds after the cylindrical vehicle dropped from the aircraft. The explosive charge blew off the vehicle door and deployed a 32-in. ribless-guide-surface extraction chute which deployed the three parachutes. Test information follows:

Drop	Launch EAS (kt)	Pressure altitude (ft)	Parachute	Open time (sec)	Reefed open (lb)	Full open (lb)	Remarks
1639-F-60	300	14,700	1st	5.2	5900	3500	(1)
			2nd	5.25	6400	1800	(2)
			3rd	6.0	6800	400	(3)
1731-F-60	325	14,770	1st	5.5	7000	3950	(4)
			2nd	5.55	5350	2100	(5)
			3rd	5.9	6100	500	(6)
1853-F-60	400	1500	1st	5.7	-	-	(7)
			2nd	6.5	-	-	(8)
			3rd	8.6	-	-	(9)

Program Structure 720F (CONT'D)

FTL-199 (CONT'D) CLUSTER PARACHUTES (PIONEER)

Drop	Launch EAS (kt)	Pressure altitude (ft)	Parachute	Open time (sec)	Reefed open (lb)	Full open (lb)	Remarks
1751-F-60	350	15,000	-	-	-	-	(10)

(1) Four 1-in. cutter burns.

(2) Gore 14 Section 2, five 2-in. tears.

(3) Three cutter 1-in. burns.

(4) Gore 7 section 3, three 3-in. tears.

(5) No damage

(6) Gore 2 section 3, blown.
Gore 11 section 1, blown.
Gore 14 section 3, seven 2-in. tears.
Gore 15 section 3, four 2-in. tears.
Gore 15 section 1, five 1-in. cutter burns.

(7) Gore 22 section 4, three 2-in. holes.
Gore 24 section 4, one 2-in. hole.

(8) Strained seams throughout.
Gore 23 section 3, one 1-in. hole.
Four 2-in. holes near the skirt.

(9) Strained seams throughout the canopy.
Gore 25, 26, 27 section 3 blown.
All gores , section 3, 52 small holes; section 4, 9 small holes.
Telemetry failed during this test.

(10) Data not presently available. To be included in next report.

Program Structure 720F

FTL-200 EVALUATION OF CORELESS LINE

Seven twisted line tests were conducted on the 50 C 7024-15 assembly, sixteen on the T-10 reserve assembly, and fifteen tests on the MT-1 assembly.

On the eleventh test of the MT-1 assembly, the twists failed to move down the lines following line stretch and a streamer occurred. This nullified these eleven drops in accordance with AF Specification Bulletin No. 505.

Program Structure 720F

FTL-201 TEST OF PARACHUTE COMPONENTS

No tests. Testing of the experimental pack opening cutter has been suspended pending delivery of contractor furnished test items. All testing to date has been accomplished on prototypes constructed within the engineering shops at WADD. Contractor delivery of test items is scheduled for October 1960.

Program Structure 720H

FTL-144 TESTS OF ANTI-FRICTION TREATED SUSPENSION LINES ON C-9 CANOPIES

No tests.

Program Structure 750A

FTL-181 HIGH ALTITUDE EJECTION SEAT TESTS

No tests. Aircraft and equipment have not been received for testing.

Program Structure 912A

FTL-172 B-5 PACK WITH MODIFIED SIDE FLAPS

No Tests.

Program Structure 912A

FTL-177 MODIFIED HARNESS FOR LIVE JUMPS

Two tests were made from the Whirl Tower at 200 knots with B-Harnesses modified with chest D-rings for riser attachment and with modified saddles. A bent form dummy was used as the test load. The weight of the total load was 313 pounds. A strain gage was used in each shoulder riser. No forces were recorded due to telemetric equipment failure. On the first test the friction bar on the left side adapter broke. Also, the stitching connecting the chest strap to the main webbings broke on the left side. No damage occurred to the second harness tested.

Program Structure 912A

FTL-185 AUTOMATIC EXTENDING PILOT CHUTE BRIDLE

One drop was made from the Whirl Tower at 100 knots with a 250-lb torso dummy (weight of telemetry package included). This test was made to determine the pilot chute forces and main canopy forces during the canopy opening. The pilot chute bridle had a fixed length of 34 inches. Test information follows:

Drop	Pilot chute diameter (in.)	Opening time (sec.)	Pilot chute max. force (lb.)	Main canopy max. force (lb.)
7449	36	2.0	255	3250

Remarks:

Partial Inversion. Gores 11, 12, and 13 were burned during deployment by pilot chute telemetry lead which was tacked to line channel 13. Section 4 of gore 28 blown. Dummy was recovered.

Program Structure 921A

FTL-225B AP-22S FULL PRESSURE SUIT TESTS

Two dummy drops and six live jumps were conducted to evaluate the AP-22S full pressure suit, back type oxygen organ and 1500-cubic inch seat kit. Two modified parachutes, P/N 50C7024-15, and two experimental multi-stage parachutes were provided by the ARDC coordinator to support the pressure suit tests.

The initial test program required the use of parachute assembly 50C7024-15, as modified for oxygen organ, seat kit and reserve parachute retention. The ARDC coordinator who was also the test subject was completely equipped with the modified parachute, oxygen organ, seat kit, reserve parachute and AP-22S full pressure suit. A 6511th Test Group test jumper preceded the ARDC test subject on each jump wearing the same equipment as the test subject minus the seat kit and the AP-22S full pressure suit. The ARDC test subject encountered a severe flat spin during the first extended free-fall delay (51 seconds) from 15,000 feet pressure altitude with the full pressure suit and the seat kit. The high rate of spin (approx. 130 rpm), attributed to the weight and configuration of seat kit and other test items attached to the jumper, necessitated manual opening of the parachute by the test subject. Testing with this configuration was discontinued due to a requirement that the test subject must be stable.

Two experimental multi-stage parachutes and a rigger qualified to pack them were provided by the ARDC coordinator. A revised test program was prepared. All tests, made at 110 knots from the C-130 aircraft, had an initial free-fall time delay of 12 seconds before actuation of the first stage parachute. The automatic release used to initiate deployment of the main parachute was set for 5000-ft. pressure altitude, followed by a 2-second time delay. Information concerning tests using the multi-stage parachute follows:

Drop	Type load	Pressure altitude (ft)	Results
1796-F-60	Articulated Dummy*	10,000	Satisfactory
1797-F-60	Articulated Dummy*	15,000	Satisfactory
1817-F-60	Test Jumper*	15,000	Satisfactory
1818-F-60	Test Subject**	15,000	(1)
1859-F-60	Test Jumper*	31,900	(2)
1860-F-60	Test Subject**	31,900	(3)

* No kit or AP-22S suit.

** Full test equipment.

Program Structure 921A (CONT'D)

FTL-225B (CONT'D) AP-22S FULL PRESSURE SUIT TESTS

(1) Kit caused severe oscillation. There was minor pack and canopy damage. Main parachute automatic release and mounting plate was torn out.

(2) Main parachute deployment bag extracted when first stage deployed. Main canopy was destroyed. Landing was made with emergency parachute.

(3) Main parachute was partially deployed with first stage parachute. There were twists in the main canopy suspension lines from risers nearly to canopy skirt. Two lines were over the main canopy. Gore No. 8 was destroyed. Test subject landed with the emergency parachute.

FTL-225B has been terminated. A report will be prepared by the ARDC coordinator.

Program Structure 921A

FTL-167 REEFING LINE CUTTER ENVIRONMENTAL TESTS

No change in status. The Hoover Oscillators used to record reefing line cutter acceleration were being used on a higher priority test program, designated as FTL-212, titled "MC-1 Cutter Environmental Tests." Testing will be resumed after completion of test program FTL-212 or upon receipt of additional Hoover oscillators.

Program Structure 921A

FTL-203 C-130 HEAVY DROP CAPABILITY

One 41,740-lb. single load was extracted from a C-130 aircraft which had been modified in the area of the ramp support rod floor attachments for a maximum loading of 50,000 pounds.

The load was extracted at 150 KIAS from an altitude of 5000 feet above the test area. Six G-11A 100-ft. D_o cargo parachutes were used to recover the 37,740-lb. suspended test weight. The aircraft was instrumented with (1) strain gauges located on the floor ramp support rods, (2) an extraction velocity recorder, and (3) a gyro compass mounted in the pilot compartment to record the angle and rate of aircraft pitch-up during extraction. A pilot-signal system was installed to indicate when the platform was clear of the aircraft. Full power was applied by the pilot immediately following release of the cluster of one each 28-ft. ring-slot parachute and 22-ft. ring-slot extraction

Program Structure 921A (CONT'D)

FTL-203 (CONT'D) C-130 HEAVY DROP CAPABILITY

parachutes after which a nose down correction was made when the signal indicated the platform system was clear of the aircraft.

The aircraft "pitch-up" following extraction was greater than on previous drops and the recovery to level flight imposed G forces which were more noticeable to the crew than on previous drops. The sequence of events following extraction up to partial deployment of the recovery parachute canopies appeared satisfactory. Four of the recovery parachutes reefed with 60-ft. lines with 6-sec. cutters, separated from the load immediately following line stretch and prior to the cutter time elapse. Two of the parachutes incurred friction breaks of the 6-ply cluster risers and two were stress breaks. The weight platform made ground impact suspended from two G-11A recovery parachutes in a squid configuration with a total down time of 22.3 seconds. No determination of the exact cause of the recovery parachute failure has been made. However, photo evaluation does not disclose any relation of the malfunction to the non-standard system. Further study will be made of this malfunction.

Program Structure 921A

FTL-212 MC-1 CUTTER ENVIRONMENTAL TESTS

Two tests were made on a 28-ft. D_o Fist ribbon parachute with a 2000-lb. cylindrical test vehicle as the suspended load. The parachute was reefed with a 2 ply 6000-lb. nylon reefing line 22-ft. long. Two MC-1 reefing line cutters with 6-second time delays were attached to the skirt of the 28-ft. parachute 180° apart. Two 1000-G accelerometers, weighted to simulate the MC-1 cutter were installed on the parachute skirt 180° apart and 90° from the cutters. Two seconds after release of the cylindrical test vehicle from the aircraft, deployment of the parachute was initiated by ejection of the parachute compartment door. The door extracted a 72-in. heavy-duty ribless-guide-surface pilot chute which was attached with a 2-ply 10,000-lb. 12-ft. bridle (Mil-W-4088B, Type XIX) to the bag of the 28-ft. parachute. A 16-ply 10,000-lb. concentric nylon 6-ft. riser (Mil-W-4088B, Type XIX) connected the 28-ft. parachute to the test vehicle. Test information follows:

Drop	Launch IAS (kt)	Pressure altitude (ft)	Full Open time (sec)	Down time (sec)	Max. force (lb)	Max. accel. (G)	Remarks
1732 F 60	400	3000	10.7	42.4	37,800	520	(1)
1584 F 60	497	3000	14.4	40.7	--	--	(2)

Program Structure 921A (CONT'D)

FTL-212 (CONT'D) MC-1 CUTTER ENVIRONMENTAL TESTS

(1) The pilot chute and main chute bag broke away before complete deployment of the main canopy.

(2) The telemetering malfunctioned and the force and "G" load data were not obtained.

Program Structure 921B

FTL-196 MERCURY CAPSULE RECOVERY

Terminated.

Program Structure 921C

FTL-190 ARMY USD-5 DRONE RECOVERY

Two functional tests and one strength test were made on the 13.4-ft. D_o FIST ribbon deceleration chute. The two functional tests were made using a 500-lb. cylindrical vehicle. The strength test was made using a 7200-lb. two-stage cylindrical vehicle. This vehicle was programmed to free-fall for 10 seconds to accelerate to 310 KIAS before the 13.4-ft. D_o FIST ribbon chute deployed. Fifteen seconds after deployment, the 13.4-ft. D_o FIST ribbon chute was programmed to separate from the vehicle and deploy two 75-ft. D_o extended skirt recovery parachutes. Test information follows:

Drop	Load (lb)	Launch IAS (kt)	Pressure altitude (ft)	Reefing line length (ft)	Reefing time delay (sec)	Reefed open time (sec)	Full open time (sec)	Down time (sec)	Remarks
142-F-60	500	400	10,000	11	6	1.8	8.5	120.6	(1)
140-F-60	500	490	10,070	12	6	1.8	8.5	124.8	(2)
138-F-60	7200	250	10,500	12	6	---	7.1*	40.6	(3)

*Stopwatch time from initiation of deployment instead of from launch.

(1) The lower lightweight ribbons showed strains.

(2) The tensiometer indicated a force in excess of 19,000-lbs. No parachute damage.

(3) Normal deployment and opening of the 13.4-ft. D_o FIST ribbon deceleration chute. There were five broken ribbons and strains in the lower ribbons. The two 75-ft. D_o recovery parachutes had not fully opened at time of impact.

SUPPORT PROJECTS

Program Structure 650A

FTL-157 TRANSONIC III TEST VEHICLE

The development contract with Radioplane Company has been terminated. Further modification and tests of the Transonic III vehicle will be accomplished by this Group.

Program Structure 650A

FTL-158 SUPERSONIC II TEST VEHICLE

No change in status. The ground acceptance test of the vehicle is scheduled to start 17 October 1960.

Program Structure 496L

FTL-179 SPACE TRACK

No missions tracked.

Program Structure 650A

FTL-160 DROP AIRCRAFT MODIFICATION

No change in status.

FTL-162 SUPERSONIC III TEST VEHICLE

Test directive was forwarded to ARDC through AFFTC and AEDC to request performance of wind tunnel tests.

FTL-165 RE-ENTRY RECOVERY SYSTEM TESTING

Final report was received from Chance-Vought Aircraft under study contract. Report completes contract.

INSTRUMENTATION

No change in status.

PARARANGE

No change in status.

WHIRL TOWER

No change in status.

CROSS REFERENCE OF PROJECTS

FTL No.	Project-Task	Prog. Struc.	USAF Prio.	Sect.	FTL Proj. Engineer	% Compl.	Estimated Compl. Date	Title
28	6173 - 61519	720F	3	FTLGR	Pranger	98	Report status	Missile and Target Recovery Parachute
140	5778 - 57987	530A	1	FTLGR	Svoboda	90	Oct 1960	G-11A Parachute Retardation Systems
143	6015 - 60780	720F	3	FTLGR	Svoboda	40	June 1961	Cluster of Three Recovery Parachutes
144	7320 - 73201	720H	2	FTLGC	Olson	27	Nov 1960	Tests of Anti-Friction Treated Suspension Lines on C-9 Canopies
147	6065 - 61510	720F	1	FTLGM	Buss	89	Dec 1960	Tests of Parachutes in Various Permeability Groups
157	1875 - 18754	650A	3	FTLGR	Svoboda	92	Feb 1961	Transonic III Test Vehicle
158	1875 - 18755	650A	3	FTLGR	Svoboda	88	Mar 1961	Supersonic II Test Vehicle
160	1875 - 18757	650A	3	FTLF	Montague	-	Unknown	Drop Aircraft Modification
162	1875 - 18759	650A	3	FTLF	Montague	5	May 1961	Supersonic III Test Vehicle
165	1875 - 18763	650A	3	FTLF	Montague	100	Completed	Re-Entry Recovery System Testing
167	- 60B21	921A	1	FTLGR	Ostrem	17	Oct 1961	Reefing Line Cutter Environmental Tests
172	- 9B01	912A	-	FTLGM	Buss	62	Nov 1960	B-5 Pack with Modified Side Flaps
177	- 9B02	912A	-	FTLGM	Buss	20	Nov 1960	Modified Harness for Live Jumps
179	1770 - 58-04C	496L	2	FTLF	Montague	-	Continuing	Space Track
181	1362 - 13437	750A	2	FTLGM	Pranger	1	Mar 1961	High Altitude Ejection Seat Tests
185	- 9B03	912A	-	FTLGM	Rosenberg	71	Feb 1961	Automatic Extending Pilot Chute Bundle
190	- 9B15	921C	-	FTLGR	Dirian	80	Sep 1960	Army USD-5 Drone Recovery
191	1412 - 60605	426L	4	FTLGR	Dirian	100	Terminated	XQ-4B Drone Recovery, Stage II
193	6173 - 61519	720F	3	FTLGR	Dirian	98	Report status	Extended Skirt Parachute Investigation
194	6015 - 60780	720F	3	FTLGR	Svoboda	86	Dec 1960	Cluster of Four Recovery Parachutes
196	- 60B01	921B	-	FTLO	McQuown	100	Terminated	Mercury Capsule Recovery
198	6077 - 60785	520B	1	FTLGC	Olson	7	Dec 1960	Test of Low Cost Parachutes
199	6015 - 60780	720F	3	FTLGR	Shaw	11	Feb 1963	Cluster Parachutes (Pioneer)
200	6015 - TR016	720F	3	FTLGC	Turk	10	Sep 1961	Evaluation of Coreless Line
201	6015	720F	3	FTLGM	Pranger	10	Feb 1961	Test of Parachute Components

CROSS REFERENCE OF PROJECTS (CONT'D)

FTL No.	Project-Task	Prog. Struc.	USAF Prio.	Sect.	FTL Proj. Engineer	% Compl.	Estimated Compl. Date	Title	Page
203	- 60B17	921A	3	FTLGC	Marshall	75	Dec 1960	C-130 Heavy Drop Capability	19
204	1301 - 58-3	201B	1	FTLGM	Rosenberg	52	Nov 1960	Live Jumps of Model "B" Seat	7
207	1301 - 13814	201B	1	FTLGM	Rosenberg	30	Mar 1961	F-106 (ICES) Survival Kit	10
208	- 60-25	609A	1	FTLGR	Dirian	70	Oct 1960	Hyper Environmental Test Systems	11
210	- 60B23	921A	1	FTLGM	Pranger	5	Jan 1961	Riser Cutter High Speed Tests	11
211	1303 - 58-6	102A	2	FTLGR	Shaw	97	Nov 1960	B-58 Escape Capsule System	
212	- 60B22	921A	1	FTLGR	Ostrem	60	Dec 1960	MC-1 Cutter Environmental Tests	20
213	- 00602	914A	2	FTLGM	Laine	0	Unknown	Modified C-11 Canopy	2
214	1326 - 13438	750A	2	FTLGR	Dirian	0	Unknown	Nose Capsule Recovery	2
216	8045 - 61560	520B		FTLGC	Olson	0	Unknown	Low Level Aerial Delivery	2
217	60B23	921A		FTLGM	Laine	85	Feb 1961	Miniature Survival Kits	1
219	8151 - 61051	720F	2	FTLGC	Olson	0	Unknown	Pressure Pack Parachute Tests	2
220		040A		FTLGM	Kanowski	-	Continuing	Proficiency and Live Jump Training	3
221	0103	117L	1	FTLGR	Dirian	25	Dec 1960	Support SAMOS Parachute Recovery	4
225B	- 60B23	921A		FTLGM	Laine	100	Completed	AP-22S Full Pressure Suit Tests	18
228	6173 - 61519	720F	3	FTLGR	Chen	0	Jun 1961	100-ft. D_o Recovery Chute	2
229	6173 - 61519	720F	3	FTLGR	Chen	0	Jun 1961	67-ft. D_o Recovery Chute	2
226	- 60B12	921B				-	Continuing	Test Support U.S. Navy	-
227	- 60B15	921C				-	Continuing	Test Support U.S. Army	
223	8044	520B	3	FTLGC	Olson	0	Unknown	Aerial Delivery System Cargo Containers	2A

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SUMMARY

GENERAL

Programs carried forward from last report	39
New programs initiated (FTL-225B, FTL-228, FTL-223 and FTL-229	4
Programs completed (FTL-165, 191, 196, 225B)	4
Total programs at end of September 1960	39

STATISTICAL DATA

Dummy, bomb and cargo tests	102
Live jumps of test items	10
Total tests from aircraft	112
Training and proficiency jumps	23
Whirl Tower drops of test items	14
Drop Tower drops (Instrument Lab.)	5
Total weight dropped from aircraft (lb)	107,915
Total weight dropped fro Whirl Tower (lb)	2,531
Total weight Drop Tower dropped (lb)	1,500
Grand total weight dropped (lb)	111,946
Air Force missions flown	133
Air Force missions flown by Navy	27
Range - No. of radar controlled drops	69
No. of drops requiring Askania	51
No. of drops requiring Contraves	32
Instrumentation - No. of telemetry channels recorded	95
Data reduction - No. of frames read	21,392
No. of drops reduced, computed and plotted	47